



Washington State  
Department of Transportation

Memorandum

Date: March 24, 1998  
From: T. M. Allen/N. Dbaibo  
OSC Geotechnical Branch  
Phone: (360) 709-5469

Subject: SR- 167, OL-2305  
15<sup>th</sup> Avenue SW to 15<sup>th</sup> Avenue NW  
HOV Lanes - Stage 3,  
MP 13.73 to MP 15.76  
Geotechnical Recommendations for  
Walls No. 3 and 10 Design  
and Review of Walls 1, 2, 4, 5 and 6

To: A.E. Stiles / N.J. Creelman  
NW Region, NB82-29

As requested, we are providing you with geotechnical recommendations for the design of retaining walls No. 3 and 10 needed to construct the AL2 line on-ramp from SR-516 to SR-167 and the AL1 on-ramp from S. 277 Street to SR-167 as part of the the 15<sup>th</sup> Avenue SW to 15<sup>th</sup> Avenue NW HOV lane on SR-167. Based on the site plan provided to our office, wall 3 begins at station AL2 100+00 and ends at station AL2 101+40.72. The maximum exposed wall height will be about 1.5 m (5 ft). Wall 10 begins at AL1 11+50 and ends at station AL1 12+75 with a maximum exposed height of about 1.12 m (3.68 ft).

In addition we have reviewed the geotechnical recommendations for the design of walls 1, 2, 4, 5 and 6 presented in WSDOT Geotechnical Report dated January 18, 1994.

It should be noted that the wall numbering has changed since the completion of the 1994 geotechnical report. A summary table of wall designation and stationing during stage 1, 2 and 3 was provided by the NW Region Office and is enclosed for reference.

The analysis, conclusions and recommendations contained in this memorandum are based on the project description, site conditions as they existed at the time of our site visit and preparation of this memo and subsurface information supplied your office and in our files. It is further assumed that the subsurface conditions as interpreted from the borings are representative of the subsurface conditions throughout the project area. If during construction, subsurface conditions are different from those encountered in the exploratory borings, or appear to be present beneath or beyond the excavations, we should be advised so that we can assist you and re-evaluate our recommendations.

## Site Soil Conditions

### *Wall No. 3*

The soil conditions at the location of wall 3 were interpreted from existing exploratory borings performed in the vicinity of the proposed wall alignment. The existing borings, drilled by WSDOT, dated August 24, 1982 and September 22, 1993, consisted of four borings extending to a depth of 7.6 m (25 ft). The borings were originally performed for the traffic signals along SR-167. Additional borings in the vicinity were performed by Terra Associates in 1991 for SR-516 undercrossing. These borings are numbered B-7 and B-12 in the referenced report. The borings generally indicate that the site is underlain by brown, loose sandy silt to a depth of approximately 3.65 m (12 ft). Below this sandy silt is black, loose to medium dense, fine to medium sand was encountered.

Groundwater was encountered at a depth of approximately 3.65 m (12 ft) below existing grades.

### *Wall No. 10*

The soil conditions at the location of wall no. 10 were inferred from the borings along the northbound on-ramp to SR-167. These borings, H-15-93 and H-16-93 were drilled as part of the 1994 WSDOT investigation. These borings indicate that the subsurface soil conditions consist of dense and very dense sandy gravel to a depth ranging between 2.43 m (8 ft) and 4.26 m (14 ft) below existing grades. Underlying this dense gravel is soft and medium stiff grey silt and sandy silt.

Groundwater was encountered at a depth of approximately 3.05 m (10 ft) below existing grades.

## Geotechnical Recommendations

We have evaluated several wall options, based on settlement considerations, it appears that the most economical wall, that could accommodate settlement, would be a gabion wall (Figure 1) or a concrete modular block wall, such as UltraBlock System (Figure 2). We performed wall stability analyses for the types of walls, including sliding and overturning at each individual basket and block elevation. The height of these walls were limited to three baskets or three blocks for each type of walls. The results of the stability analyses indicate that the walls meet the required criteria for sliding and overturning.

If a gabion wall is selected, the basket construction and backfill should be in accordance with Standard Plans Sheet D-6. The gabion wall should be constructed in accordance with the 1998 Standard Specifications Section 6-09. In addition the following recommendations should be included in the Special Provisions for the wall design and construction:

1. The wall shall be placed on a level foundation in the horizontal direction perpendicular to the wall face or it could be battered at 1V:6V. The leveling pad should be composed of select borrow, per Section 9-03.14(2).
2. Wall face batter should be 6V:1H.
3. Wall base embedment should be at least 0.3 m (1 ft) below final finished grade.
4. The wall height should be limited to two baskets high. If in localized areas, more than two baskets are needed, then the first row of baskets should be two baskets wide.

As an alternative to a gabion basket wall, concrete modular blocks can be used to construct the proposed walls. The interlocking concrete wall systems are composed of concrete blocks measuring approximately 1.5 x 0.75 x 0.75 m (5 x 2.5 x 2.5 feet). The use of the concrete interlocking wall system assumes that the following conditions are met:

1. Blocks shall be stacked no more than two blocks in height with their short dimension perpendicular to the slope. If more than two blocks are needed, then the first block should be stacked with its longest dimension perpendicular to the face of the slope.
2. Blocks shall be stacked in a manner such that adjacent lower blocks are interlocked by the top blocks.
3. Wall face batter shall be no steeper than 1H:6V.
4. No reject or returned concrete shall be used in the casting of the blocks.

The base blocks should be supported on at least one foot of select borrow, per section 9-03.14(2). Drainage provisions should also be provided behind the wall system. Gravel backfill for walls, per Section 9-03.12, should be used for wall backfill. A geotextile layer should be placed between the native silty soil and the gravel backfill. Construction Geotextile for Underground Drainage, Low Survivability, Class C should be used. Special Provisions for the concrete modular retaining wall are enclosed.

#### **Review of Geotechnical Recommendations for Walls 1, 2, 4, 5 and 6**

The design recommendations for walls 1, 2, 4, 5 and 6 were addressed in a geotechnical report by WSDOT dated January 18, 1994. This report recommended that walls 1, 2, 4, 5 and 6 be constructed as mechanically stabilized earth walls (MSE). Design recommendations including soil unit weights, friction angles and allowable bearing capacities are presented in the 1994 report and are considered adequate. No change in the design recommendations is anticipated for these walls.

### Closure

We trust this information is sufficient at this time. Should you have questions or require further information, please contact Nabil Dbaibo at (360) 709-5469 or Jim Cuthbertson at (360) 709-5452.

TMA:ntd

NTD

Attachments

cc: M. Lwin, Bridges & Structures, 47340  
A. Young, Bridges & Structures, 47340  
A. Korynta, OSC Construction, 47354  
B. Rennie, NW NB82-114  
J. Johnson, NW NB82-143

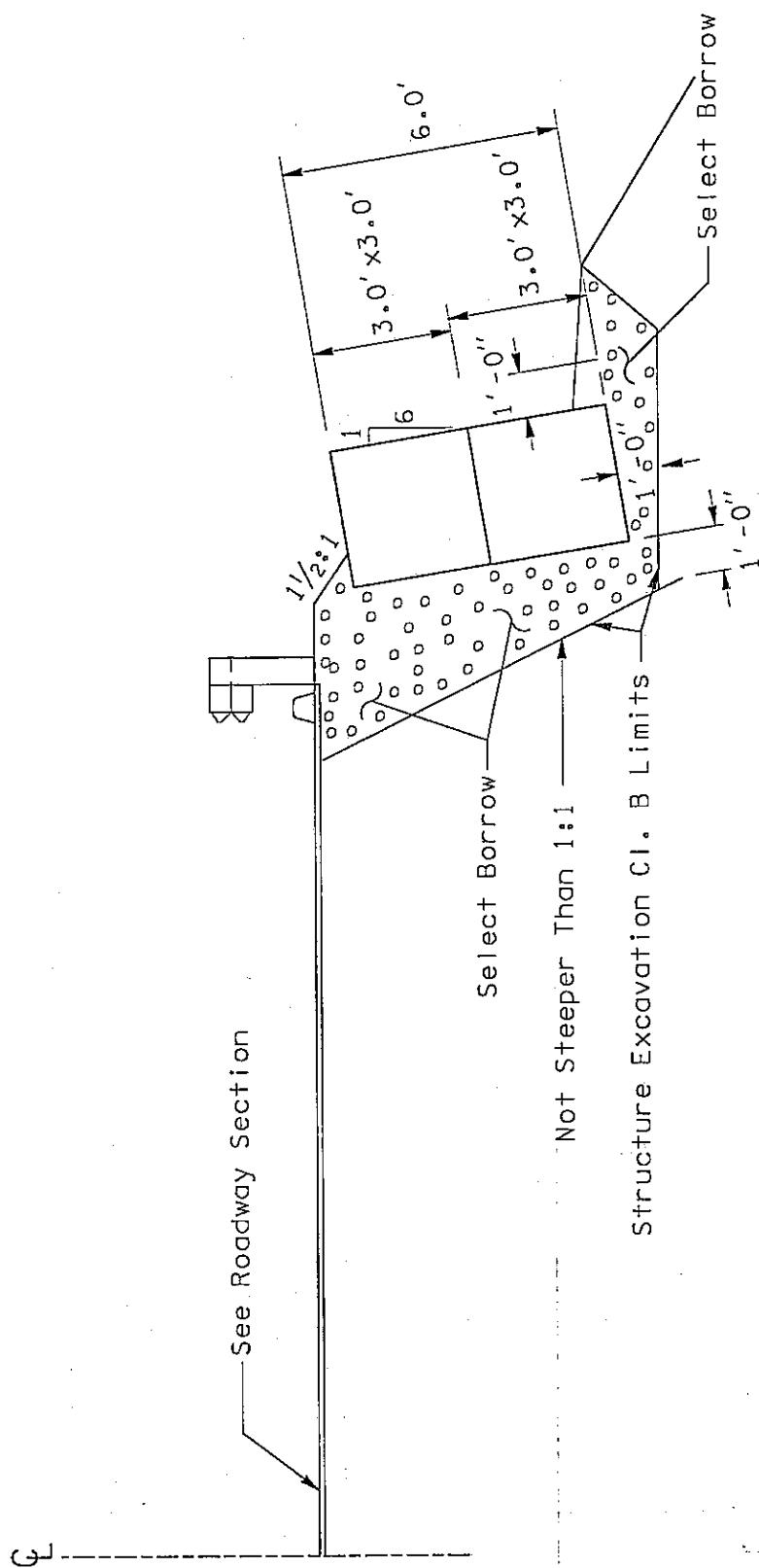


FIGURE 1: GABION CRIBBING DETAIL

JOB 01-2305 S.R. 167 C.S.

15th AVE. SW TO 15th AVE. NW  
HOV LANES - STAGE 3

WASHINGTON STATE  
TRANSPORTATION COMMISSION  
DEPARTMENT OF TRANSPORTATION  
MATERIALS BRANCH  
D.C. JACKSON MATERIALS ENGINEER

DATE MAR. 1998  
SCALE  
VERT. \_\_\_\_\_  
HORIZ. \_\_\_\_\_  
SHEET \_\_\_\_\_ OF \_\_\_\_\_  
DRAWN BY \_\_\_\_\_

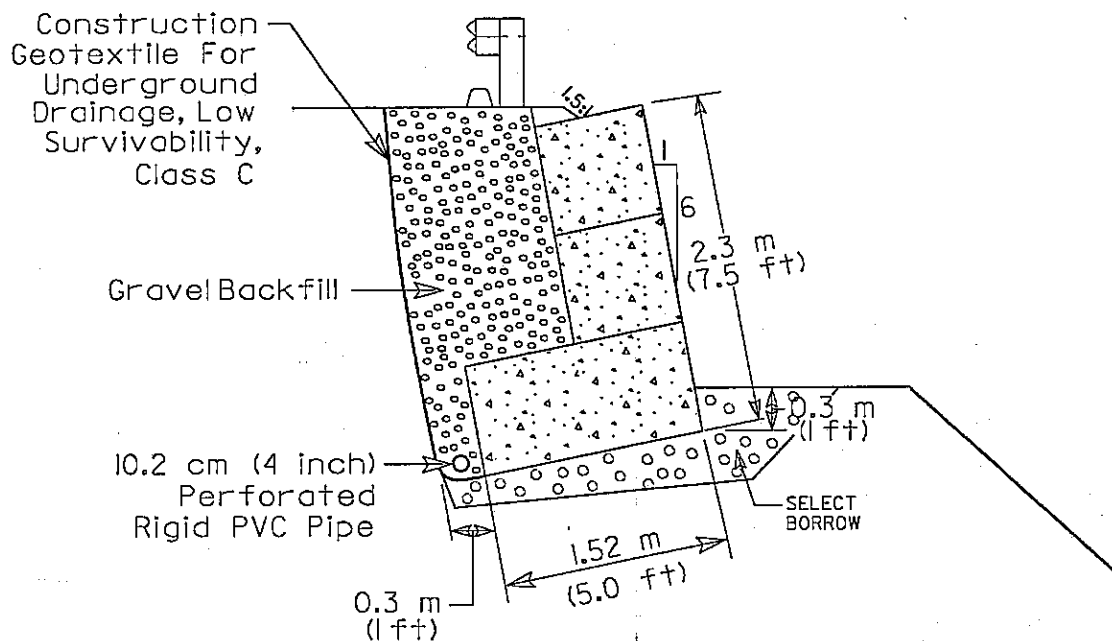
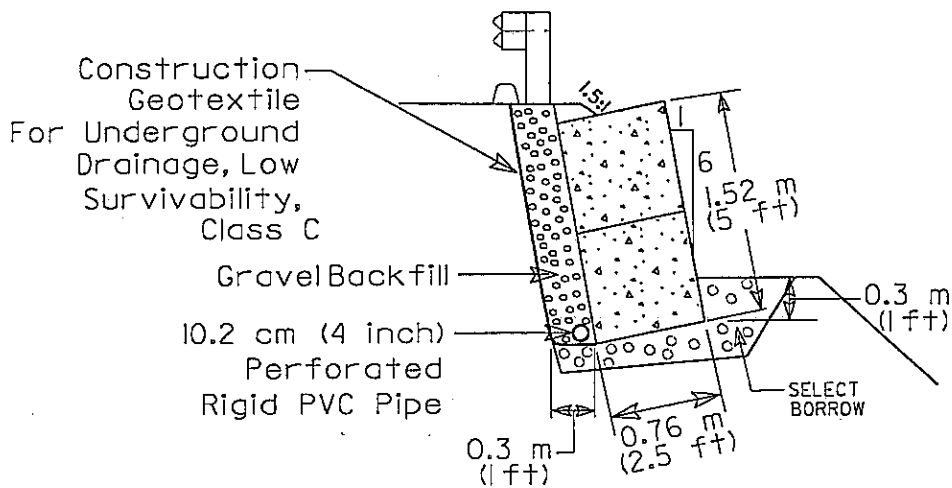



FIGURE 2: CONCRETE MODULAR BLOCK WALL

JOB 01-2305 S.R. 167 C.S.	
15th AVE. SW TO 15th AVE. NW HOV LANES - STAGE 3	
 WASHINGTON STATE TRANSPORTATION COMMISSION DEPARTMENT OF TRANSPORTATION MATERIALS BRANCH D. C. JACKSON MATERIALS ENGINEER	DATE MAR. 1998 SCALE NONE VERT. HORZ. SHEET OF DRAWN BY LSH

SR 167 - 15TH SW TO 15TH NW					
HOV LANES - STAGE 3					
Listed below are walls to be designed or constructed under this project.					
				Old	Stage 3
Wall Name	Begin Sta.	End Sta.	Wall #	Wall #	
15TH NW AL2 (S/B on)	Eliminated	Eliminated	-	-	
So. 277th DR1 (N/B on)	DR1' 19+70 (27.60' RT)	LM 725+14.69 (84.71' RT)	1	1	
Soils Report Sta.	DR1' 19+80	LM 725+00			
PS&E Shelf Copy	DR1' 19+70 (28.6' RT)	LM 729+81 (76.37' RT)			
(stage 2)					
So. 277th AL1 (S/B on)	Eliminated	Eliminated	-	-	
SR 516 AL2' (S/B on)	LM 791+70.00 (95.15' LT)	AL2' 93+40.16 (34.97' LT)	2	2	
Soils Report Sta.	LM 790+50	AL2 95+50			
PS&E Shelf Copy	L 790+57.50 (95.0' LT)	AL2' 94+94.90 (45.47' LT)			
(stage 2)					
SR 516 AL2' (S/B on)	AL2 100+00.0 (40.88' LT)	AL2 101+40.72 (39.68' LT)	None	3	
Soils Report Sta.	None	None			
SR 516 DR2' (N/B on)	DR2' 7+94.75 (29' RT)	L 812+07.84 (90.0' RT)	3	4	
Soils Report Sta.	DR2 8+78	L 811+08			
PS&E Shelf Copy	DR2' 7+94.75 (30.27' RT)	L 812+07.84 (90.0' RT)			
(stage 2)					
NOTES:					
Soils Report:	Soils report was compiled in March of 1992 under the title "15th St S.W. To South Grady Way"				
Stage 1:	Stage 1 of SR 167 is titled "84th Ave. So. To So. Grady Way". The walls specified as stage 1 walls were designed in stage 1 but were not constructed.				
Stage 2:	Stage 2 shelf project is titled "SR 167 - Main St. To 84th Ave. So. HOV And SC&DI. This project was later modified and the walls mentioned here as stage 2 shelf walls were eliminated from the project before it went to Ad.				

## SR167 STAGE 3 WALL LIST

84TH AL3' (S/B on)		L 884+60 (86.8' LT)	AL3' 89+60 (28.58' LT)	5	5
	Soils Report Sta.	LM 892+50	AL3 89+30		
	PS&E Shelf Copy	L 884+60 (89.2' LT)	AL3' 89+88 (30' LT)		
	(stage 2)				
84TH AR3' (N/B off)		L 877+90 (67.16' RT)	AR3' 83+70 (15' RT)	10	6
	Soils Report Sta.	None	None		
	PS&E Shelf Copy	L 877+90 (68.15' RT)	AR3' 83+65.85 (16' RT)		
	(stage 2)				
180TH AL2' (S/B on)		AL2' 54+14.04 (22.48' LT)	AL2' 55+72.02(22.14' LT) =	6	7
		L 1054+30.68(90.74' LT)	L 1055+88.63 (93.57' LT)		
	Stage 1 PS&E Copy	L 1052+12.21 (83.9' LT)	AL2' 55+90 =		
			L 1056+07.9 (94.3' LT)		
		Soil Nail Wall was designed in stage 1			
180TH DR2' (N/B on)		L 1075+60 (69.8' RT)	L 1083+50.29 (54' RT)	7	8
	Stage 1 PS&E Copy	L1075+60 (70.68' RT)	L 1083+50.29 (54.87' LT)		
		Wall was designed in stage 1 and no change to the design is anticipated.			
NOTES:					
Soils Report:	Soils report was compiled in March of 1992 under the title "15th St S.W. To South Grady Way"				
Stage 1:	Stage 1 of SR 167 is titled "84th Ave. So. To So. Grady Way". The walls specified as stage 1 walls were designed in stage 1 but were not constructed.				
Stage 2:	Stage 2 shelf project is titled "SR 167 - Main St. To 84th Ave. So. HOV And SC&DI. This project was later modified and the walls mentioned here as stage 2 shelf walls were eliminated from the project before it went to Ad.				
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F. 26 66 (Rev. 5-67)

WASHINGTON  
STATE HIGHWAY COMMISSION  
DEPARTMENT OF HIGHWAYS

Original to Materials Engineer  
Copy to Bridge Engineer  
Copy to District Engineer  
Copy to \_\_\_\_\_

## LOG OF TEST BORING

S.H. SR 516 Section SR 516 WILLIS ST. SIGNALS Job No. 4-3106  
Hole No. 6 Sub Section SIGNAL NO. 7 Cont. Sec. 2.35  
Station SR 516 L12+38 Offset 570' RT. Ground El. -21.5  
Type of Boring WILLIAMS HOLLOW STEM AUGER Casing \_\_\_\_\_ W.P. El. -1210' (-)  
Inspector V.W. Date 8-24-82 Sheet 1 of 2

PIK	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
0	P-1 5		0.3' REC. ↑ 2 2 ↓ 3 3	O.G. MOIST brown sandy SILT
2	U-1	X	↑ D EF ↓	MOIST brown sandy SILT w/ fine roots
5	P-2 5		1.8' REC. ↑ 2 3 ↓ 2 2	MOIST brown SILTY fine to medium SAND
	U-2	X	↑ ABC DEF ↓	WET MOTTLED SLIGHTLY SANDY, SLIGHTLY
10	P-3 3	X	1.3' REC. ↑ 1 2 ↓ 1 1	CLAYEY SILT WET brown SILTY fine to medium SAND
	U-3		↑ N ↓	NO RECOVERY
15	P-4 10		2.0' REC. ↑ 2 4 ↓ 6 4	WET black SILTY fine to medium SAND
	P-5 14		10' REC. ↑ 4 6 8 ↓ 10	WATER EL. 8-25-82 -1210' WET black SLIGHTLY SILTY fine to medium SAND

Hole No..

Sub Section 519 kcal No. 7

Sheet 2 of 2

[illegible]

WASHINGTON  
STATE HIGHWAY COMMISSION  
DEPARTMENT OF HIGHWAYS

Original to Materials Engineer  
Copy to Bridge Engineer  
Copy to District Engineer  
Copy to \_\_\_\_\_

## LOG OF TEST BORING

S.H. \_\_\_\_\_ S.R. 516 Section SR 167 NB, SB, Ramps Job No. 6-3106  
No. 3 Sub Section Signal # 5 Cont. Sec. 35'  
SR 516 I11+64 Offset 55.0' Lt Ground El. -3.0' ±  
of Boring Mobile B-pl Augers Casing \_\_\_\_\_ W. El. -11.0'  
Factor N.C. Date 8-3-82 Sheet 1 of 2

BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			O.G.
P-1 5	↑ ↓ * ↓ * ↓ ↓ ↓ ↓ ↓	↑ 2 2 Rec 1.0' 3 ↓ 3	dry brown silty sandy SILT
		↑ 1 U-1 abc ↓ 1	dry brown silty fine SAND
P-2 10		↑ 3 4 Rec 1.3' 6 ↓ 4	moist mottled silty fine to medium SAND
P-3 2		↑ 2 1 Rec 1.4' 1 ↓ 2	wet brown sl silty SAND, grades to a clayey gray silt with some organic material
		↑ 1 U-2 abcde ↓ 1	moist, black, sl silty SAND with lenses of silty gray clay from -10.0' to -11.0'
P-4 8		↑ 5 4 4 Rec 2.0' ↓ 7	wet black sl silty fine to medium SAND
		↑ 1 U-3 abcde ↓ 1	wet black sl silty fine to medium SAND
P-5 11		↑ 3 6 5 Rec 1.4' ↓ 6	wet black sl silty fine to medium SAND

[illegible]

WASHINGTON STATE  
DEPARTMENT OF TRANSPORTATION

PG. 1/1

MATERIALS ENGINEER

Materials Laboratory

P.O. Box 167, Olympia, WA 98504 (Mailing Address)

45 So. 2nd Ave.

Olympia, Washington 98504 (Shipping Address)

Place Seattle

Date 9-1-82

DISTURBED

Dear Sir:

I have forwarded by today's State of the following Foundation Samples.

Contract or  
Job No.

L-3106

Section

Willis St. Signals

SR No.

516

Sub-Section

Signal No. 5

Station  
&  
Offset

211 + 64, 55.0' L.

Hole #

3

Lab No.	Drive #	Depth	Tube Position in Sampler	Clas.	Description
185	P-1	-0.5' to -1.0'	H <sub>2</sub> O = 12%	ML	L.H. 2453-2 W/IT. CL. AND SLT Moist, tan, dk. brn. SILT
1					W/ Layers of F. SAND & Rust Streaks
2	P-2	-5.0' to -6.3'		ML	to L.H. 2454 Layering of Rust
3	P-3	-7.5' to -8.0'		ML	L.H. 2455-1 ABOVE L.H. 2454 / 2455
4	P-4	-13.0' to -14.5'		ML	L.H. 2456-2 NO LAYERS of Rust
5	P-5	-17.0' to -19.3'		ML	L.H. 2463-2 NO LAYERS of Rust
6	P-6	-20.0' to -21.2'		ML	SAME AS ABOVE w/ Piece of Grass
7	P-7	-23.0' to -24.4'		ML	SAME NO LAYERS of Rust

1 copy with samples  
1 copy to addressee

Yours very truly,

K. E. WHALEN  
DIST. MAT'L S. ENGR.  
450 So. Spokane St.

# BORING NO. 7

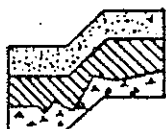
Logged By DBG

Date 6-14-91

ELEV. 60±

Graph	US CS	Soil Description	Depth (ft.)	Sample	(N) Blows Ft.	W (%)	
	SM	Black, silty SAND, fine to medium grained, wet.	70	I	29	24	
		Black SAND, fine to medium grained, wet, dense.	75	I	60	23	
			80	I	68	*	
			85	I	59	*	
			90	I	64	26	
	SP GP	Black SAND and GRAVEL, wet, dense.	95	I	63	26	
				I	46	15	

Boring completed at depth 99 feet.  
Groundwater noted at 27 feet.



**TERRA  
ASSOCIATES**

Geotechnical Consultants

BORING LOG  
STATE ROUTE 167  
KING COUNTY, WASHINGTON

Proj. No. 1630

Date 10-91

Figure A-8

# BORING NO. 12

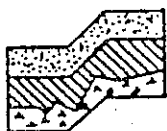
Logged By DBG

Date 6-24-91

ELEV. 59±

Graph	US CS	Soil Description	Depth (ft.)	Sample	(N) Blows Ft.	W (%)
	SM	Tan to gray, silty, gravelly SAND, fine to medium grained, moist to wet, dense. (FILL)	5 10 15 20 25	I I I I I	56 72 100+ 44 84	10 7 10 8 6
	SM SP	Gray to black, silty SAND, fine grained, moist, loose to medium dense. (Lenses of clean SAND)	30 35	I I	13 8	32 33
	ML	Gray, fine sandy SILT with trace organics, wet, soft. Becomes stiff.	40 45	I II	4 15	35 46
	SM SP	Black silty SAND fine grained wet, loose (Some SILT lenses) Black SAND, wet, dense.	50 55 60 65	I I I I	7 40 17 59	34 25 29 21

BORING CONTINUED ON NEXT PAGE



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BORING LOG  
STATE ROUTE 167

KING COUNTY, WASHINGTON

Proj. No. 1630

Date 10-91

Figure A-13

# BORING NO. 12

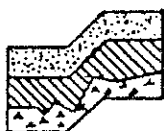
Logged By DBG

Date 6-24-91

ELEV. 59±

Graph	US CS	Soil Description	Depth (ft.)	Sample	(N) Blows Ft.	W (%)	
	SM	Black silty SAND with occ'l silt layers.	-70	I	25	*	
			-75	I	63	25	
			-80	I	65	23	
	SP	Becomes less silty.	-85	I	74	*	
			-90	I	90	29	
			-95	I	48	21	
	SP GP	Black SAND and GRAVEL wet, dense.		I	93	13	

Boring completed at depth 99 feet.  
Groundwater noted at 32 feet.



**TERRA  
ASSOCIATES**

Geotechnical Consultants

BORING LOG  
STATE ROUTE 167  
KING COUNTY, WASHINGTON

Proj. No. 1630

Date 10-31

Figure A-13



## LOG OF TEST BORING

Washington State  
Department of TransportationS.R. **167** SECTION **Main Street to 84th Avenue South**Job No. **L-1511**Hole No. **H-13-93** Sub Section **Wall #10**Cont. Sec. **1766**Station **W2 12+50**Offset **8.0' Rt. of Wall CL**Ground El. **47.0'**Type of Boring **Skid Rig**

Casing

W.T. El. **34.0'**

Inspector

Date **September 16, 1993**Sheet **1** of **3**

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	WELL PP
	81/11"		STD PEN 1	Very dense, brown, moist, silty, fine to coarse sandy <b>GRAVEL</b> with occasional cobbles. Retained 1.0 ft.	
5	68		STD PEN 2	<b>*SP-SM, M.C.=5.0%</b> Very dense, brown, moist, silty, fine to coarse sandy <b>GRAVEL</b> with occasional cobbles. Retained 0.5 ft.	
10	10		STD PEN 3	<b>ML, M.C.=27.5%</b> Stiff, mottled dark brown, moist, fine sandy <b>SILT</b> with trace of organics. Retained 1.0 ft.	
15	3		STD PEN 4	Soft, mottled, wet, very sandy <b>SILT</b> with trace of organics. Retained 1.5 ft.	
20			U-1	<b>ML, M.C.=57.4%</b> Gray, wet, fine sandy <b>SILT</b> with fine lenses of fibrous organic material.	

Continued Next Page

## LOG OF TEST BORING

Washington State  
Department of TransportationS.R. **167** SECTION **Main Street to 84th Avenue South**Job No. **L-1511**Hole No. **H-13-93** Sub Section **Wall #10**Cont. Sec. **1766**Station **W2 12+50**Offset **8.0' Rt. of Wall CL**Ground El. **47.0'**Type of Boring **Skid Rig**

Casing

W.T. El. **34.0'**

Inspector

Date **September 16, 1993**Sheet **2** of **3**

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	WELL PP
	4		STD PEN 5	<b>ML, M.C.=39.0%</b> Soft, wet, fine sandy <b>SILT</b> with fibrous organic material. Retained 1.5 ft.	
			U-2	No recovery.	
25	37		STD PEN 6	Dense, black, wet, silty, fine to medium <b>SAND</b> . Retained 1.0 ft.	
30	3		STD PEN 7	<b>ML, M.C.=41.4%</b> Soft, gray, wet <b>SILT</b> . Retained 1.2 ft.	
			U-3	No recovery.	
35	26		STD PEN 8	Very stiff, gray, wet, fine sandy <b>SILT</b> . Retained 0.2 ft.	
40					

Continued Next Page

## LOG OF TEST BORING

Washington State  
Department of TransportationS.R. **167** SECTION **Main Street to 84th Avenue South**Job No. **L-1511**Hole No. **H-13-93** Sub Section **Wall #10**Cont. Sec. **1766**Station **W2 12+50**Offset **8.0' Rt. of Wall CL**Ground El. **47.0'**Type of Boring **Skid Rig**

Casing

W.T. El. **34.0'**

Inspector

Date **September 16, 1993**Sheet **3** of **3**

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	WELL PP
	15		STD PEN 9	<b>ML, M.C.=31.7%</b> Stiff, gray, wet, fine sandy <b>SILT</b> with fibrous organic material. Retained 1.5 ft.	
				End of test hole boring at 41.5 ft. below ground elevation.	
				*Laboratory test results reflect the finer fraction of soil observed in the field.	
				This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.	
45					
50					
55					
60					

## LOG OF TEST BORING

Washington State  
Department of TransportationS.R. **167** SECTION **Main Street to 84th Avenue South**Job No. **L-1511**Hole No. **H-14-93** Sub Section **Wall #10**Cont. Sec. **1766**Station **W2 10+50**Offset **6.0' Rt. of Wall CL**Ground El. **45.0'**Type of Boring **Skid Rig**

Casing

W.T. El. **33.0'**

Inspector

Date **September 21, 1993**Sheet **1** of **3**

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	WELL PP
				ACP	
	56		STD PEN 1	Very dense, brown, moist, silty, gravelly, fine to coarse <b>SAND</b> . Retained 1.0 ft.	
5	8		STD PEN 2	<b>SP-SM, M.C.18.2%</b> Loose, gray, moist, silty, gravelly, fine to coarse <b>SAND</b> . Retained 1.5 ft.	
				▽	
10	13		STD PEN 3	<b>SP, M.C.=4.9%</b> Medium dense, brown, moist, slightly silty, fine to coarse <b>SAND</b> with root hairs. Retained 1.5 ft.	
15	3		STD PEN 4	<b>ML, M.C.=41.7%</b> Soft, gray, wet, fine sandy <b>SILT</b> with fibrous organic material.	
			U-1	Loose, gray, wet, silty, fine <b>SAND</b> . Retained 1.5 ft.	
20					

Continued Next Page

## LOG OF TEST BORING

Washington State  
Department of TransportationS.R. **167** SECTION **Main Street to 84th Avenue South**Job No. **L-1511**Hole No. **H-14-93** Sub Section **Wall #10**Cont. Sec. **1766**Station **W2 10+50**Offset **6.0' Rt. of Wall CL**Ground El. **45.0'**Type of Boring **Skid Rig**

Casing

W.T. El. **33.0'**

Inspector

Date **September 21, 1993**Sheet **2** of **3**

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	WELL PP
	14		STD PEN 5	<b>ML, M.C.=24.2%</b> Stiff, gray, wet, fine sandy <b>SILT</b> . Retained 1.5 ft.	
				Tried to push U.D. at 22.5 ft., met with resistance.	
25	17		STD PEN 6	<b>SP-SM, M.C.=26.5%</b> Medium dense, dark gray, wet, silty, fine to medium <b>SAND</b> . Retained 1.5 ft.	
30	11		STD PEN 7	Medium dense, dark gray, water bearing, silty, fine to medium <b>SAND</b> .	
			U-2	Medium stiff, dark gray, wet, fine sandy <b>SILT</b> . Retained 1.0 ft.	
35	28		STD PEN 8	<b>ML, M.C.=24.4%</b> Very stiff, dark gray, wet, fine sandy <b>SILT</b> . Retained 1.5 ft.	
40					

Continued Next Page

## LOG OF TEST BORING

Washington State  
Department of TransportationS.R. **167** SECTION **Main Street to 84th Avenue South**Job No. **L-1511**Hole No. **H-14-93** Sub Section **Wall #10**Cont. Sec. **1766**Station **W2 10+50**Offset **6.0' Rt. of Wall CL**Ground El. **45.0'**Type of Boring **Skid Rig**

Casing

W.T. El. **33.0'**

Inspector

Date **September 21, 1993**Sheet **3** of **3**

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	WELL PP
	34		STD PEN 9	Hard, dark gray, wet, fine sandy <b>SILT</b> . Retained 1.5 ft.	
			18 20 14		
				End of test hole boring at 41.5 ft. below ground elevation.	
				This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.	
45					
50					
55					
60					

## LOG OF TEST BORING

Washington State  
Department of TransportationS.R. **167** SECTION **Main Street to 84th Avenue South**Job No. **L-1511**Hole No. **H-15-93** Sub Section **Wall #10**Cont. Sec. **1766**Station **D1 21+00**Offset **20.0' Lt. of Wall CL**Ground El. **45.0**Type of Boring **Skid Rig**

Casing

W.T. El. **35.0'**

Inspector

Date **September 22, 1993**Sheet **1** of **2**

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.		DESCRIPTION OF MATERIAL	WELL PP
					ACP	
	34		STD PEN 1	13 17 17	Dense, brown, moist, silty, fine to coarse sandy <b>GRAVEL</b> . Retained 0.8 ft.	
5	88		STD PEN 2	20 43 45	Very dense, brown, moist, dense, silty, fine to coarse sandy <b>GRAVEL</b> . Retained 0.8 ft.	
10	15		STD PEN 3	15 7 8	∇ Medium dense, gray, wet, silty, fine to coarse sandy <b>GRAVEL</b> .	
15	7		STD PEN 4	3 4 3	Medium stiff, gray, wet, very sandy <b>SILT</b> .	
			U-1	A THRU F	Medium stiff, gray, wet, sandy <b>SILT</b> .	
20						

Continued Next Page

## LOG OF TEST BORING

Washington State  
Department of TransportationS.R. **167** SECTION **Main Street to 84th Avenue South**Job No. **L-1511**Hole No. **H-15-93** Sub Section **Wall #10**Cont. Sec. **1766**Station **D1 21+00**Offset **20.0' Lt. of Wall CL**Ground El. **45.0**Type of Boring **Skid Rig**

Casing

W.T. El. **35.0'**

Inspector

Date **September 22, 1993**Sheet **2** of **2**

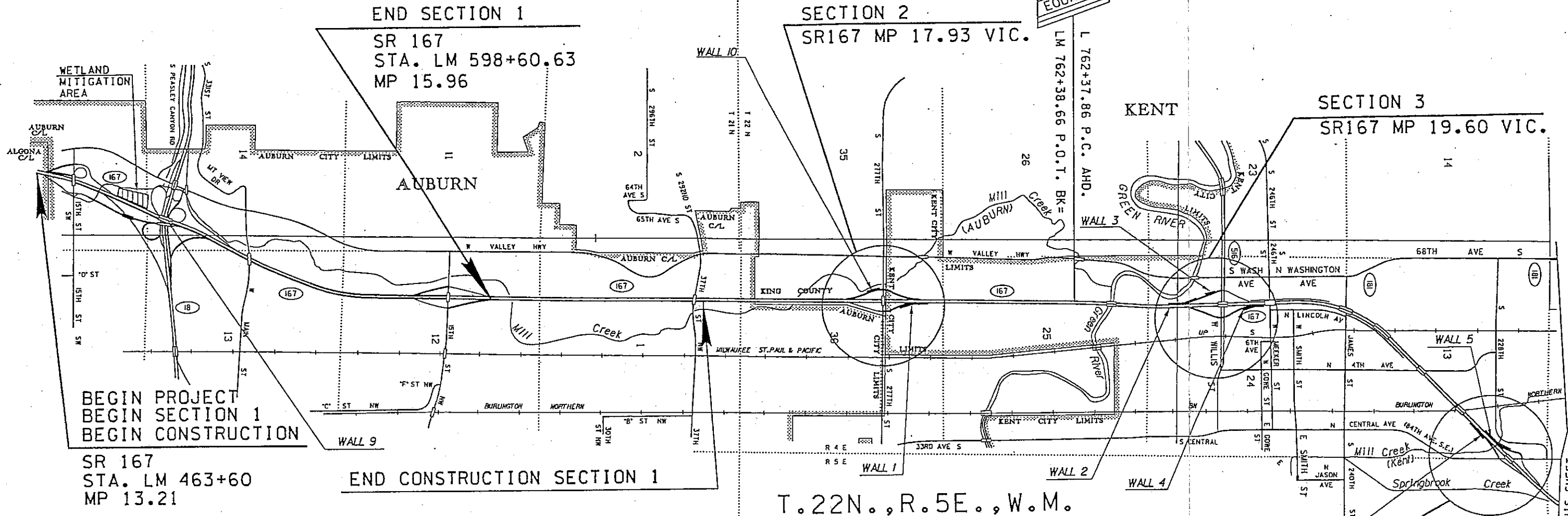
DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL	WELL PP
	15		STD PEN 5	<b>ML, M.C.=29.5%</b> Stiff, black, wet, fine sandy <b>SILT</b> . Retained 0.9 ft.	
25	5		STD PEN 6	Medium stiff, black, wet, fine sandy <b>SILT</b> .	
	25		STD PEN 7	<b>SP, M.C.=19.7%</b> Dense, black, wet, fine to coarse <b>SAND</b> . Retained 1.5 ft.	
30	26		STD PEN 8	Dense, black, wet, fine to coarse <b>SAND</b> . Retained 1.5 ft.	
				End of test hole boring at 31.5 ft. below ground elevation.	
35				This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.	
40					



goudar m  
s:\412353\12305\stg3view.dgn  
10 FEB 98  
PLOT1

T.21N.,R.4E.,W.M. T.22N.,R.4E.,W.M.

EQUATION



MATCH LINE THIS SHEET

T.22N.,R.5E.,W.M.

SECTION 5  
SR167 MP 22.00 VIC.

END PROJECT  
END SECTION 6  
END CONSTRUCTION

SR 167  
STA. L 1084+50  
MP 24.97

SECTION 4  
SR167 MP 21.31 VIC.

SECTION 6  
SR167 MP 24.42 VIC.

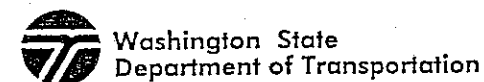
0 1000 2000  
SCALE IN FEET

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SCALE IN FEET

DESIGNED BY	ENTERED BY	CHECKED BY	PROJ. ENGR.	REGIONAL ADM.	DATE	DATE	REVISION	BY
M. LABORN	K. MCLEAN	M. ASKARIAN	J. JOHNSON	J. OKAMOTO				

REGION NO.	STATE	FED.AID PROJ.NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		

ENVIRONMENTAL AND ENGINEERING  
SERVICE CENTER



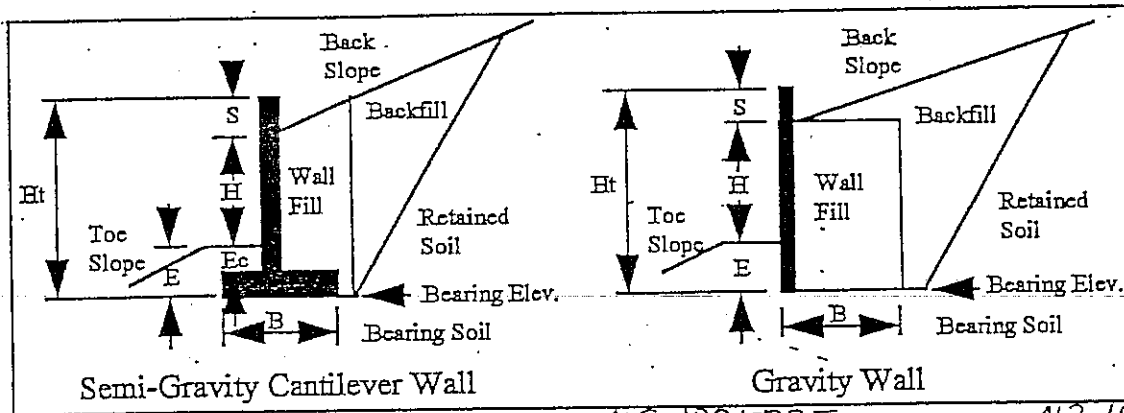
SR 167  
15TH ST SW TO 15TH ST NW  
HOV AND SC&DI - STAGE 3

VICINITY MAP

V1  
SHEET  
OF  
SHEETS

## WALL SITE DATA CHECKLIST

Region NW SR 167 Job No. 0L2305 Date March 9, 1997  
 Project 154<sup>th</sup> to 157<sup>th</sup> AOV Ramp Bypasses - Stage 3



Wall No. or Name 3 AL2 100+00 = AL2 101+40.72 =  
 Begin Station WALL 0+00 End Station WALL 1+56  
 Max Ht = 8' Max H = 5' S = 0 Back Slope = H: V Front Slope = H: V

Wall No. or Name \_\_\_\_\_ Begin Station \_\_\_\_\_ End Station \_\_\_\_\_  
 Max Ht = \_\_\_\_\_ Max H = \_\_\_\_\_ S = \_\_\_\_\_ Back Slope = H: V Front Slope = H: V

Region Project Office 412353 Region Contact Person Kenny Ezeokeke

☒ Plans showing location of wall or reinforced slope:

- ☒ Utilities (existing or proposed) which may influence wall design/selection are shown
- ☒ Buildings, bridges, existing and proposed adjacent walls, culverts, drainage structures, and/or minor structures which may influence wall design are shown
- ☒ Right of way lines and other geometric constraints to wall construction are shown
- ☒ Existing ground contours are shown

☒ Wall/reinforced slope profiles:

- ☐ Existing grades in front of and behind the wall are shown
- ☐ Final grades in front of and behind the wall are shown

☒ Wall/reinforced slope cross-sections:

- ☒ Provided at approximately every 15 m or at 25 ft
- ☒ Shows existing and proposed groundlines
- ☒ Shows locations of existing and proposed utilities (none)
- ☒ Shows locations of culverts, drainage structures, and adjacent structures which may interfere with wall/reinforced slope or which may create surcharge loads
- ☐ Shows intensity and aerial extent of surcharge loads, if known

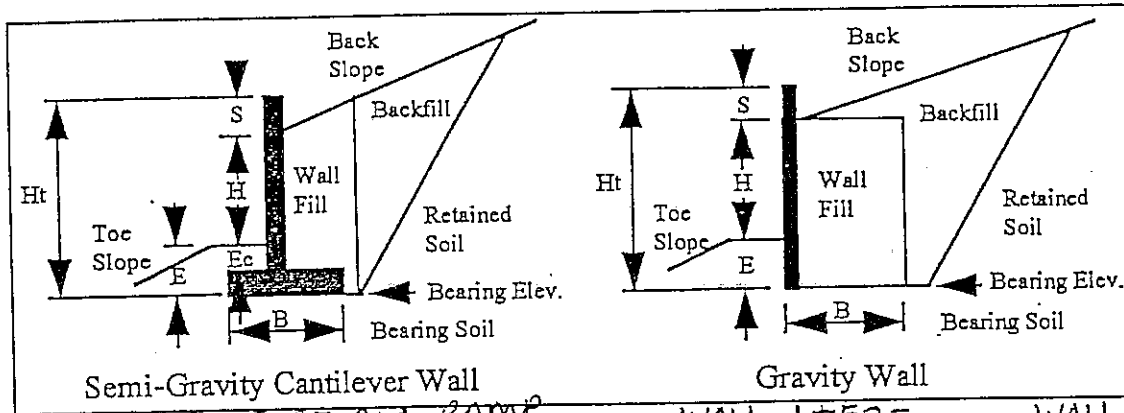
☒ Concrete traffic barrier and/or beam guardrail locations provided as needed

☒ Desired aesthetics described

WALL #10

# WALL SITE DATA CHECKLIST

Region NW REGION SR 167 Job No. 0L2305 Date 2/17/98  
Project 15TH ST SW TO 15TH ST NW, HOV LANES-STAGE 3



S. 277th ST ALL RAMP WALL 1+50 = WALL 2+92.75 =  
Wall No. or Name #10 Begin Station AL1 11+50 End Station AL1 12+75.00  
Max Ht = 6.68 Max H = 3.68 S = 0 Back Slope = H: V Front Slope = H: V

Wall No. or Name \_\_\_\_\_ Begin Station \_\_\_\_\_ End Station \_\_\_\_\_  
Max Ht = \_\_\_\_\_ Max H = \_\_\_\_\_ S = \_\_\_\_\_ Back Slope = H: V Front Slope = H: V

Region Project Office JOHN JOHNSON Region Contact Person KENNY EZEKEKE

- ☒ Plans showing location of wall or reinforced slope:
  - ☒ Utilities (existing or proposed) which may influence wall design/selection are shown
  - ☒ Buildings, bridges, existing and proposed adjacent walls, culverts, drainage structures, and/or minor structures which may influence wall design are shown
  - ☒ Right of way lines and other geometric constraints to wall construction are shown
  - ☒ Existing ground contours are shown

- ☒ Wall/reinforced slope profiles:
  - ☒ Existing grades in front of and behind the wall are shown
  - ☒ Final grades in front of and behind the wall are shown

- ☒ Wall/reinforced slope cross-sections:
  - ☒ Provided at approximately every 15 m or at \_\_\_\_\_ m
  - ☒ Shows existing and proposed groundlines
  - ☐ Shows locations of existing and proposed utilities
  - ☐ Shows locations of culverts, drainage structures, and adjacent structures which may interfere with wall/reinforced slope or which may create surcharge loads
  - ☐ Shows intensity and aerial extent of surcharge loads, if known

☒ Concrete traffic barrier and/or beam guardrail locations provided as needed

☐ Desired aesthetics described

## Special Provisions

### Concrete Modular Retaining Wall

#### *Description*

This work consists of constructing a concrete interlocking block retaining wall in accordance with these Special Provisions and in close conformity to the lines, grades, and typical sections shown in the Plans or established by the Engineer.

#### *Material*

Individual blocks shall be constructed with LOCK-BLOCK molds and shall be 1.5 x 0.75 x 0.75 m (2.5'x2.5'x5') and shall be made in accordance with Class 3000 Concrete and shall meet all the requirements of this section

Blocks shall have keys that will lock together when subsequent layers are turned either parallel or perpendicular to the wall face. The surface finish of the exposed face of the blocks shall be without large blemishes, such as honeycombed areas or chipped surfaces.

One supplier of LOCK-BLOCK molds is: Ultrablock, Inc., 7000 NE 40<sup>th</sup> Avenue, #D-3, Vancouver, WA 98661, 800-377-3877

#### *Construction Requirements*

##### *Working Drawings*

Prior to fabrication of the precast concrete blocks, the Contractor shall submit working drawings to the Engineer for approval. The drawings shall include, but not limited to, block dimensions, construction sequence and method, plan, and elevation of the wall.

##### *Quality Assurance*

The top of the wall shall be within two (2) inches of the line and grade shown in the plans.

#### *Payment*

The unit contract price per square foot for "Concrete Modular Retaining Wall" shall be full pay for performing the work as specified.